

A 2500-64

5/85

paper paperboard wood pulp capacity



1983-1986

with additional data for 1987

fiber consumption



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commentary

Paper and paperboard capacity in place during 1984 will average 72.7 million tons, 1,623,000 tons or 2.3% above 1983. For the future years covered in this survey; namely, 1985 through 1987, growth in capacity is expected to moderate to an average of 1.6% a year. The net gain of 3,568,000 tons of capacity obtained from new and improved manufacturing facilities will bring the industry's production potential to 76.3 million tons in 1987.

Capacity to produce wood pulp, which is expected to reach 57.1 million tons this year for an increase of 1.8%, will also grow at a slower rate, averaging 1.4% annually through 1987. Net additions during this three-year period should increase capacity for producing wood pulp by 2,460,000 tons to a level approaching 60 million

tons. During these same three years, market pulp capacity is expected to increase by 497,000 tons or 6.6%.

A breakdown of planned increases by major product groups (Table 1) shows that printing and writing paper mills, which now account for 26% of total paper and paperboard capacity, will supply an impressive 61% of all capacity growth in the 1985-1987 period. Above average rates of expansion are also indicated for tissue papers and for solid bleached paperboard; all three categories should experience higher rates of growth than they achieved during the previous ten years.

In contrast to these plans for stronger growth, producers of newsprint and unbleached kraft packaging papers have shut down some facilities and plan further shutdowns which, despite some offsetting increases, will result in a decline in capacity for these products of some 300,000 tons by 1987.

Note: Unless stated otherwise, all references to paper and paperboard and wood pulp exclude construction grades.

TABLE 1:
GROWTH TRENDS IN CAPACITY

Thousands short tons

GRADES	ADDITIONS 1975-1984		ADDITIONS 1985-1987	
	10 YEAR INCREASE	AVERAGE ANNUAL GROWTH	3 YEAR INCREASE	AVERAGE ANNUAL GROWTH
TOTAL ALL GRADES PAPER & PAPERBOARD	12,013	1.7%	3,545	1.5%
TOTAL PAPER & PAPERBOARD	13,222	2.0	3,568	1.6
TOTAL PAPER	8,319	2.6	2,283	2.0
NEWSPRINT	2,125	1.7	(55)	(0.3)
PRINTING & WRITING	5,642	3.4	2,183	3.6
PACKAGING & IND. CONV.	(369)	(0.6)	(222)	(1.3)
TISSUE	921	2.0	377	2.3
TOTAL PAPERBOARD	4,903	1.5	1,285	1.2
UNBLEACHED KRAFT	3,825	2.5	572	1.1
SOLID BLEACHED	266	0.7	252	2.0
SEMICHEMICAL	789	2.2	174	1.1
RECYCLED	22	—	287	1.1
CONSTRUCTION GRADES	(1,209)	(3.4)	(23)	(0.3)

TOTAL ALL GRADES WOOD PULP	9,666	1.8%	2,407	1.4%
TOTAL WOOD PULP (excluding pulp for Construction Paper & Board)	10,002	1.9	2,460	1.4
DISSOLVING & SPECIAL ALPHA	(320)	(1.9)	—	—
SULPHITE	(675)	(3.2)	(2)	—
SULPHATE & SODA*	8,678	2.3	2,186	1.7
SEMICHEMICAL	336	0.8	85	0.6
MECHANICAL	1,982	4.0	191	1.0
WOOD PULP FOR CONSTRUCTION PAPER & BOARD	(336)	(2.2)	(53)	(1.4)

*includes screenings

Not adjusted for rounding differences.

commentary

TABLE 2:
COMPARISON OF CAPACITY ESTIMATES
FOR TOTAL PAPER & PAPERBOARD

Thousands short tons

SURVEY PUBLISHED IN:	ESTIMATES					
	1982	1983	1984	1985	1986	1987
1979	70,564					
1980	70,406	71,565				
1981	70,355	71,833	72,964			
1982	70,197	71,155	72,455	73,806		
1983	70,086*	70,814	71,965	73,054	74,084	
1984		71,126*	72,749	73,700	74,973	76,317
WIDEST DEVIATION FROM ACTUAL *Actual	0.7%	1.0%	WIDEST RANGE			
			1.4%	1.0%	1.2%	—

TABLE 3:
ANNUAL CAPACITIES 1970-1987

Thousands short tons

YEAR	ANNUAL CAPACITY		CAPACITY ADDITIONS DURING YEAR		PERCENT INCREASE	
	PAPER & PAPERBOARD	ALL GRADES	PAPER & PAPERBOARD	ALL GRADES	PAPER & PAPERBOARD	ALL GRADES
1970	53,260	57,195	1,140	1,221	2.2%	2.2%
1971	54,136	58,141	876	946	1.6	1.7
1972	55,873	59,965	1,671	1,824	3.1	3.1
1973	58,164	62,284	2,291	2,319	4.1	3.9
1974	59,527	63,779	1,363	1,495	2.3	2.4
1975	60,140	64,369	613	590	1.0	0.9
1976	61,307	65,673	1,167	1,304	1.9	2.0
1977	62,004	66,459	697	786	1.1	1.2
1978	63,091	67,419	1,087	960	1.8	1.4
1979	64,615	69,033	1,524	1,614	2.4	2.4
1980	66,368	70,716	1,753	1,683	2.7	2.4
1981	68,172	72,255	1,804	1,539	2.7	2.2
1982	70,086	73,118	1,914	863	2.8	1.2
1983	71,126	74,017	1,040	899	1.5	1.2
1984F	72,749	75,626	1,623	1,609	2.3	2.2
1985F	73,700	76,553	951	927	1.3	1.2
1986F	74,973	77,827	1,273	1,274	1.7	1.7
1987F	76,317	79,171	1,344	1,344	1.8	1.7

F—Forecast

Comparison of Survey Estimates

Table 2, which compares capacity estimates made in the last six API surveys, suggests that business climate may affect producers' year-to-year estimates of capacity. It shows, for example, that for 1982 previous capacity surveys had overstated the actual capacity, with the widest deviation being 0.7%. A similar tendency to overstate capacity occurred in the earlier surveys of 1983 capacity. The effects of the 1981-1982 recession and reduced profitability are clearly revealed in the steady erosion of expansion plans made during those years.

The 1983 recovery brought a reverse movement, and this year's survey shows capacity for paper and paperboard in 1984 about 784,000 tons larger than anticipated in the 1983 survey.

Printing and writing papers experience an increase of 921,000 tons of capacity this year compared with the estimates made last year; unbleached kraft paperboard is 119,000 tons higher while shutdowns remove 235,000 tons of recycled paperboard capacity. The total capacity reported for subsequent years is also higher than last year's survey showed. The reasons for some of these changes will be covered in the sections describing each of the major grades.

These adjustments reflect the ability of some producers to modify machine schedules and product allocations to meet changing demand conditions. This flexibility is sometimes referred to as "sponge." We remind readers again that capacity estimates derived from the surveys represent the best efforts of mill managers and planners to estimate the changes in machine capacity that can result from several

TABLE 4:
REGIONAL DISTRIBUTION-CAPACITY & CHANGES

GRADES	NORTHEAST		CENTRAL		SOUTH		WEST	
	SHARE OF U.S. CAPACITY 1983	SHARE OF U.S. CAPACITY CHANGES 1984-1987*	SHARE OF U.S. CAPACITY 1983	SHARE OF U.S. CAPACITY CHANGES 1984-1987*	SHARE OF U.S. CAPACITY 1983	SHARE OF U.S. CAPACITY CHANGES 1984-1987*	SHARE OF U.S. CAPACITY 1983	SHARE OF U.S. CAPACITY CHANGES 1984-1987*
PAPER & PAPERBOARD								
TOTAL†	16.7%	10.8%	18.5%	17.1%	52.0%	63.3%	12.8%	8.8%
PRINTING & WRITING	32.7	12.2	29.9	20.9	29.5	58.0	7.9	8.9
TISSUE	30.4	28.6	25.8	15.0	27.1	57.1	16.7	(0.7)
UNBL. KRAFT PAPERBOARD	—	—	—	—	83.7	88.7	16.3	11.3
SEMICHEMICAL PAPERBOARD	2.0	0.4	32.6	27.5	50.8	58.1	14.6	14.0
WOOD PULP								
TOTAL†	7.7%	1.4%	6.5%	15.1%	70.2%	75.4%	15.6%	8.1%
SULFATE & SODA	5.7	1.2	3.3	13.9	76.1	76.1	14.9	8.8
SEMICHEMICAL	10.9	1.4	30.8	20.1	45.1	79.7	13.2	(1.2)
MECHANICAL	19.9	2.5	11.1	21.5	46.5	69.3	22.5	6.7

*Percent change in four year period

†Total of grades shown

TABLE 5:
FIBER SOURCES FOR PAPER & PAPERBOARD MANUFACTURE

Thousands short tons

GRADES	1983		1984	1985	1986	1987	
	ANNUAL TONS	PERCENT	ANNUAL TONS	ANNUAL TONS	ANNUAL TONS	ANNUAL TONS	PERCENT
TOTAL CONSUMPTION	68,087	100.0%	72,358	74,062	76,102	77,154	100.0%
PRIMARY FIBERS	30,582	44.9	32,616	33,421	34,378	34,933	45.3
WOOD PULP	30,582	44.9	32,616	33,421	34,378	34,933	45.3
SECONDARY FIBERS	37,505	55.1	39,742	40,641	41,724	42,221	54.7
WOOD PULP	21,252	31.2	22,387	22,561	22,823	23,094	29.9
RECYCLABLE PAPER*	15,822	23.2	16,912	17,607	18,410	18,634	24.2
OTHER	431	0.7	443	473	491	493	0.6

Note: Consumption for 1985-1987 assumes capacity levels of production.

*Includes the following tonnage consumed in the manufacture of molded pulp products: 1983, 174,000 tons; 1984, 184,000 tons; 1985-1987, 192,000 tons.

sources, including changes in demand. Volatile demand conditions can alter these estimates in any given year, although over the long run the changes tend to balance out.

The survey also indicates that there will be no major changes in the number of operating days. Yet current labor contracts provide more flexibility in this matter than earlier negotiations permitted. The overall effect of working rule changes on the industry's capacity can only be ascertained after demand and production conditions make their effect apparent.

Regional Capacity

The sixteen states which constitute the Southern census region of the country produce 52% of all U.S. paper and paperboard and 70% of all wood pulp. As reported in this survey, planned expansions in this region will further increase its share of capacity;

about 63% of all capacity growth in paper and paperboard and 75% of wood pulp expansions in the four years 1984-1987 will take place in the Southern region.

The Northeast, Central and Western regions will all lose share of paper and paperboard capacity during this four-year period and only the Central region, with a large greenfield market pulp mill slated for completion in 1987, will expand its capacity base for wood pulp.

New Survey Feature

In response to requests for additional information on the age and geographical distribution of facilities in place in the pulp and paper industry, we have included a series of tables on pages 20 through 23 that show the data by regions and by major grades. The tables include previously unavailable statistics on the age and geographical

commentary

distribution of paper machines and on the integration to wood pulp in paper and paperboard mills. Tracing the median values of the age of paper machines by product group shows a tendency in all groups for machines to cluster around the 10-year period; that is, half of the capacity was installed prior to 1975 and half after that. Tissue and packaging and industrial paper machines have a somewhat older median age while semichemical paperboard machines are of slightly more recent vintage. Thus, despite significant changes in the trends of growth in each grade of paper and paperboard over the years, there has been a fairly steady pattern of updating and improving the capacity that is retained.

Raw Materials

Fueled by increases in paper and paperboard production, the consumption of wood pulp, recyclable paper and other paper-making raw materials will increase from 68.1 million tons in 1983 to a record 72.4 million tons in 1984. This substantial 6.3% increase follows a strong 8% increase in consumption in 1983 as the paper industry recovered from the 1982 recession.

Recovered products will continue to be the major source of furnish, accounting for almost 55% of the total. During the 1984-1987 years, wood pulp produced from manufacturing and forest residues is expected to decline from 31.2% to 29.9% of total fiber consumed while share for recyclable paper is expected to grow from 23.2% in 1983 to 24.2% in 1987.

PAPER AND PAPERBOARD

Newsprint

In recent years U.S. newsprint capacity has grown at a rapid pace. However, for the four-year period 1984 through 1987, respondents to our survey report no major expansions either from the installation of new paper machines or from the conversion of existing machines to newsprint production from other product grades. In addition, one existing machine was shut down this year and two more will be idled in 1985 and the capacities of these machines totalling more than 300,000 tons, have been removed from the estimates made in the 1983 survey.

As a result of this combination of circumstances, newsprint capacity is expected to decline in the three years ahead; our estimates show a 55,000 ton reduction in annual capacity by 1987. The most recent Canadian Pulp

and Paper Association survey, released in April 1984, projects no growth in Canadian newsprint capacity between 1983 and 1986.

Printing and Writing

Generally favorable market conditions in the past have encouraged producers of printing and writing papers to increase capacity by almost 5 million tons or about 36% in the ten-year period ending in 1983. Very strong growth in demand and production in 1983 and 1984 resulted in upward adjustments of reported capacity for these years. The survey shows 19.8 million tons of printing and writing paper capacity in 1984, 921,000 tons above the level estimated in last year's survey. Much of the upward revision was in uncoated free sheet papers, with estimates for 1984 now 529,000 tons higher than anticipated last year. In coated papers, both groundwood and free sheet, 1984 capacity is reported 320,000 tons higher than in last year's survey.

Analysis of these increases shows that machine rebuilds and speed-ups, restarts of idle machines, and accelerated start-ups or improved performance on new paper machines account for much of the gain. A considerable, although smaller, increase was also achieved from changes which resulted in higher productivity of machines. Such increases in capacity were also evident in the similarly strong markets that prevailed in 1973; they demonstrate the flexibility with which the industry is able to respond to near-term increases in changing demands for its products.

Planned capacity additions to printing and writing papers over the next three years, including the start-up of at least seven new paper machines, will add an additional 2,183,000 tons of capacity and yield a growth rate averaging 3.6% per year. If all of these new facilities are carried through to completion, capacity in printing and writing papers will reach almost 22 million tons in 1987 and comprise 29% of all paper and paperboard.

Tissue

Capacity expansions for tissue papers, including sanitary and industrial grades, will average 2.3% in the 1985-1987 years, to reach 5.6 million tons in 1987. This rate of growth exceeds the average annual rate of increase of 2.0% per year from 1974 through 1984 and confirms the more aggressive plans of tissue paper producers that were reported in last year's survey.

Packaging Papers

Over a ten-year period, capacity for unbleached kraft packaging papers has declined by 435,000 tons to a level slightly below the 1974 capacity of 4.4 million tons. For the most part, these losses have reflected increased competition from alternative packaging materials, which has accelerated the closure of marginal or unprofitable facilities and has contributed to the modification of some paper machines to produce other grades. Loss of capacity will continue, according to the survey, and the shutdown of three paper machines in 1984 and 1985 will contribute to a further 6% decline—or 250,000 annual tons—by 1987.

Unbleached Kraft Linerboard and Semichemical Paperboard

With only one new kraft linerboard machine and no new semichemical paperboard machines committed to come into production after 1984, growth in capacity for these containerboard grades will average only slightly more than 1% annually over the next three years.

While these growth rates fall considerably below historical levels, any assessment of the manufacturing potential for containerboard must take into account that some kraft paper machines can be converted to produce kraft linerboard. In addition, a number of expansion projects have been under active study for some time and, since much preliminary work has already been completed, could probably be brought into production fairly rapidly.

Solid Bleached Paperboard

After a ten-year period of low growth in which increased capacity for bleached paperboard averaged only 0.7% annually, new expansions, as presently planned, should yield a 6% increase totalling 252,000 tons between 1985 and 1987. Projects scheduled for completion during this period include a new paperboard machine, some plant modernization and the shutdown of some existing capacity.

Recycled Paperboard

The recycled paperboard segment of the industry has been undergoing major structural changes. Over time, excess capacity, erratic markets and the availability of substitute products have contributed to a prolonged period in which no significant growth in capacity has been possible. One indication of these operating difficulties has been the permanent shutdown, between 1970 and 1984, of more

than 100 machines with capacities totalling more than 3 million tons. Despite these closures, which comprised almost 30% of all paper and paperboard facilities shut down during this period, recyclers have added to capacity sufficiently to maintain a 12% to 15% share of total industry capacity.

A more positive growth picture is foreseen in the 1985-1987 period with new expansions, including the start-up of a major new paperboard machine, expected to provide a 287,000 ton capacity increase.

WOOD PULP

Dissolving Pulps

The producers of dissolving and special alpha pulps report that capacity will remain unchanged at 1.5 million tons through 1987. Virtually all of these high cellulose pulps are marketed for end uses outside the paper industry.

Sulfite Pulps

Sulfite pulp capacity has declined steadily in recent years both in absolute tons and in share of total chemical paper grade pulps. This reduced capacity, which is partly due to the high cost of bringing mills into compliance with stringent government pollution control standards, continues into 1984 with the shutdown of two mills with capacities totalling approximately 100,000 tons. Although no capacity changes are reported for the remaining three years in this survey, it is possible that additional mill closings may occur during this period.

Sulfate and Soda Pulps

A greenfield pulp mill and other major expansion projects are expected to increase capacity for sulfate and soda pulps by 2,186,000 tons or 5.1% in the three years 1985-1987. All of the planned expansions will be in bleached and semibleached pulps which will expand capacity by a full 10% and boost their share of all sulfate pulps from 51.1% in 1984 to 53.6% in 1987. Unbleached pulps, however, are not only expected to lose share during these years but also to experience a slight overall decline in capacity. Factors contributing to this loss will include changes in end use, which will require the conversion of existing facilities from unbleached to bleached pulps, and the absence of major kraft linerboard expansions, which would require comparable expansion in unbleached pulp.

Mechanical Pulps

Thermomechanical pulps were first produced in U.S. mills in 1975 and are now widely used as furnish for newsprint and groundwood printing papers. While the nine-year period of exceptionally strong growth, in which capacity increased at a rate averaging almost 40% yearly, appears to have ended in 1984, capacity will nonetheless increase by 194,000 tons over the next three years and account for all of the new growth in mechanical pulps.

Pulps for Market Sale

Pulp-drying machines allocated to the production of sulfate market pulp will expand market pulp capacity from an annual level of 5.7 million tons in 1984 to 6.2 million tons in 1987. This 2.8% average annual growth rate is significantly higher than the 1.7% average rate for sulfate pulps as a whole and continues a ten-year period of sustained growth in which market pulp supply has increased by more than 60%.



Norma Pace
Senior Vice President
November, 1984

paper & paperboard capacity summary annual

Practical Maximum Basis Thousands short tons

GRADES	1983	1984	1985	1986	1987*
TOTAL ALL GRADES	74,017	75,626	76,553	77,827	79,171
Total Paper & Paperboard	71,126	72,749	73,700	74,973	76,317
Total Paper	35,675	36,851	37,297	38,100	39,134
NEWSPRINT	5,774	5,847	5,758	5,765	5,792
PRINTING WRITING & RELATED	18,633	19,770	20,462	21,087	21,953
Uncoated Groundwood	1,710	1,693	1,710	1,712	1,713
Coated Groundwood	3,522	3,701	3,744	3,863	4,262
Coated Free Sheet	2,473	2,704	2,849	2,959	3,069
Uncoated Free Sheet	9,354	10,083	10,559	10,915	11,266
Cotton Fiber	162	176	180	180	181
Thin Papers	347	338	338	338	338
Solid Bleached Bristols	1,065	1,075	1,082	1,119	1,126
PACKAGING & IND. CONV.	6,078	5,991	5,755	5,754	5,769
Unbleached Kraft	4,065	3,954	3,704	3,700	3,705
Bleached Packaging & Ind. Conv.	569	566	571	556	556
Specialty Packaging	550	551	554	563	565
Special Industrial	894	919	926	934	942
TISSUE	5,190	5,243	5,322	5,494	5,620
Total Paperboard	35,451	35,898	36,403	36,874	37,183
UNBLEACHED KRAFT	17,511	17,790	18,027	18,214	18,362
of which Kraft Linerboard	16,217	16,488	16,723	16,914	17,052
SOLID BLEACHED	4,129	4,187	4,321	4,354	4,439
SEMICHEMICAL	5,119	5,219	5,299	5,350	5,393
RECYCLED	8,692	8,702	8,756	8,956	8,989

Total Construction Paper & Board and Other	2,891	2,877	2,853	2,854	2,854
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*Capacity additions presented here for 1987 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

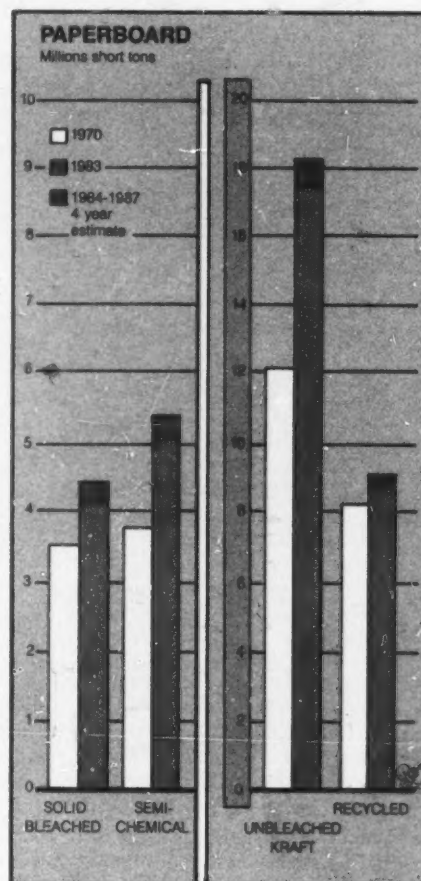
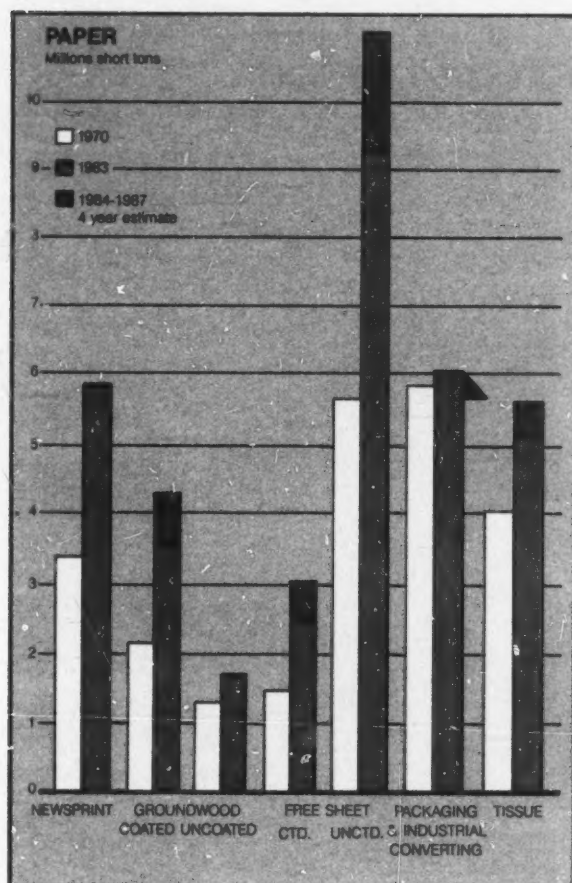
Totals not adjusted for rounding differences.

capacity reductions

MILLS AND MACHINES SHUT DOWN

1970-1975				1976-1979			
Grades	Number of Machines	Number of Complete Mills	Annual Capacity	Grades	Number of Machines	Number of Complete Mills	Annual Capacity
TOTAL	183	56	3,514	TOTAL	105	27	2,606
Paper & Paperboard				Paper & Paperboard			
Newsprint	—	—	—	Newsprint	3	1	231
Printing-Writing	68	13	1,062	Printing-Writing	27	3	468
Pkg. & Ind. Conv.	24	6	222	Pkg. & Ind. Conv.	24	4	357
Tissue	24	8	250	Tissue	16	5	154
Unbleached Kraft	2	—	128	Unbleached Kraft	1	1	240
Solid Bleached	2	—	61	Solid Bleached	2	1	162
Semichemical	6	2	248	Semichemical	2	—	145
Recycled	49	23	1,362	Recycled	19	5	630
Construction Paper & Board	8	4	181	Construction Paper & Board	11	7	219

capacity/annual growth comparison



PAPER AND PAPERBOARD

Thousands short tons

1980-1982			
Number of Machines	Number of Complete Mills	Annual Capacity	
		Removed from Survey	Not Removed from Survey
188	87	5,015	225
1	—	26	—
27	5	517	134
22	8	341	—
29	12	264	91
6	—	792	—
—	—	—	—
7	2	449	—
25	12	967	—
71	48	1,659	—

Thousands short tons

1983-1987			
Number of Machines	Number of Complete Mills	Annual Capacity	
		Removed from Survey	Not Removed from Survey
39	15	1,392	371
3	—	305	—
5	—	58	14
5	—	372	—
8	4	101	—
1	—	225	—
1	—	83	—
1	—	47	—
8	7	119	197
7	4	82	160

Shutdowns represent machines and mills reported to the API as permanent or indefinite closures and have been removed from capacity totals. Not all of the facilities have been dismantled and some portion of their productive capacity could be restored.

wood pulp

capacity summary annual

Practical Maximum Basis
Thousands short tons

GRADES	1983	1984	1985	1986	1987*
TOTAL ALL GRADES WOOD PULP	57,590	58,461	59,069	60,237	60,868
Total Wood Pulp (exc. pulp for Construction Paper & Board)	56,143	57,139	57,800	58,968	59,599
DISSOLVING	1,525	1,504	1,504	1,504	1,504
CHEMICAL PAPER GRADES	44,284	44,980	45,650	46,721	47,165
SULFITE PAPER GRADES	1,788	1,726	1,718	1,722	1,724
SULFATE & SODA PAPER GRADES	42,495	43,255	43,932	44,999	45,441
Bleached & Semibleached Softwood	12,111	12,429	12,954	13,339	13,518
Bleached & Semibleached Hardwood	9,179	9,663	10,105	10,671	10,823
Unbleached	21,206	21,163	20,873	20,989	21,100
SEMICHEMICAL	4,490	4,569	4,609	4,624	4,654
MECHANICAL	5,814	6,054	6,005	6,088	6,245
SCREENINGS	31	31	31	31	31

Total Wood Pulp for Construction Paper & Board†	1,447	1,322	1,269	1,269	1,269
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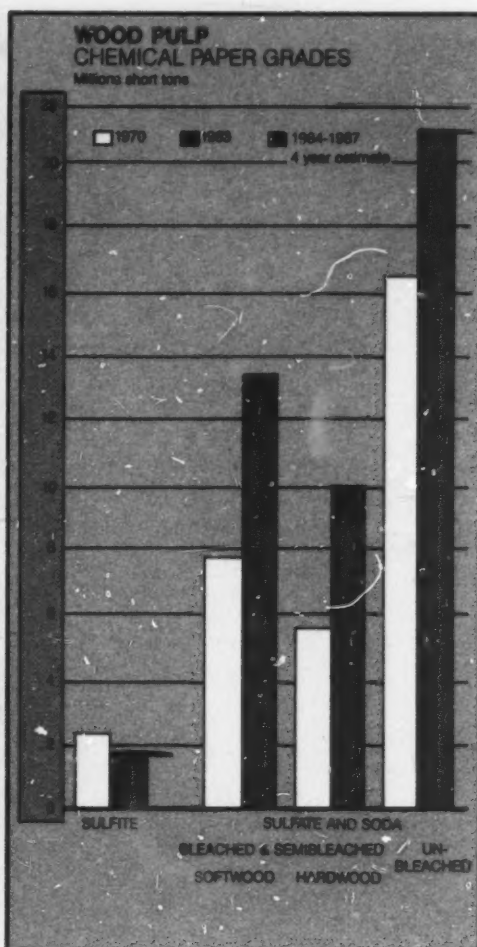
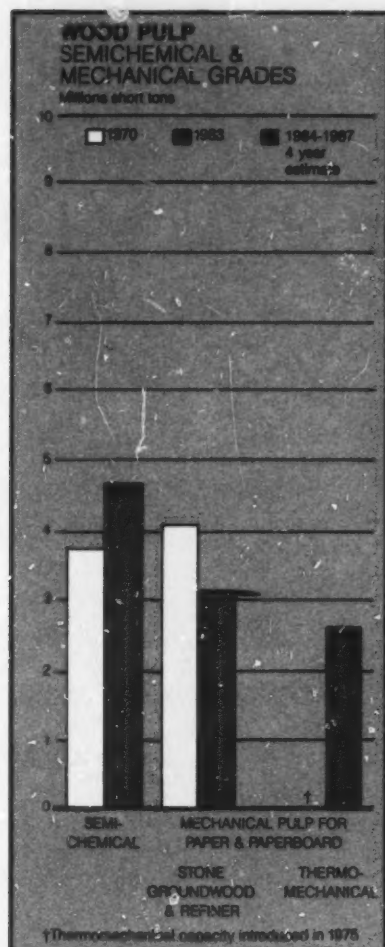
TOTAL MACHINE DRIED WOOD PULP	9,647	9,833	10,283	10,539	10,485
DISSOLVING	1,525	1,504	1,504	1,504	1,504
CHEMICAL PAPER GRADES	8,014	8,220	8,670	8,926	8,872
SULFITE	475	489	491	491	491
SULFATE	7,539	7,731	8,179	8,435	8,381
Bleached & Semibleached	7,380	7,569	8,017	8,225	8,167
Unbleached	159	162	162	210	214
ALL OTHER	108	110	110	110	110

*Capacity additions presented here for 1987 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

†Excludes the defibrated/exploded pulp capacity of mills that produce hard pressed board.

Totals not adjusted for rounding differences.

capacity/annual growth comparison



Practical Maximum Basis
Thousands short tons

GRADES	1983	1984	1985	1986	1987*
TOTAL MARKET WOOD PULP	7,414	7,569	7,994	8,172	8,066
DISSOLVING	1,519	1,504	1,504	1,504	1,504
CHEMICAL PAPER GRADES	5,881	6,051	6,477	6,654	6,548
SULFITE	352	359	359	359	359
SULFATE	5,529	5,692	6,118	6,295	6,189
Bleached & Semibleached	5,372	5,532	5,958	6,088	5,977
Unbleached	157	160	160	208	212
ALL OTHER	14	14	14	14	14

Based on information provided by producers. Reflects diversion of drying capacity to and from own use, installation of new equipment and retirement of existing equipment.

*Capacity additions presented here for 1987 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

Totals not adjusted for rounding differences.

paper by grade

capacity/annual • year end • daily

	ALL GRADES PAPER & PAPER-BOARD Total	PAPER & PAPER-BOARD Total	Practical Maximum Basis Thousands short tons	PAPER Total	NEWS-PRINT Total	Total	Uncoated Ground-wood
ANNUAL CAPACITY 1983-1987	74,017	71,126	1983 Annual Capacity	35,675	5,774	18,633	1,710
Annual Capacity includes changes in capacity only for the portion of the year in which they are actually effective	589 1,020 75,626 407 520 76,553	588 1,035 72,749 405 545 73,700	1984 Annual Capacity	36,851	5,847	19,770	1,693
			1985 Annual Capacity	37,297	5,758	20,462	1,710
	984 290 77,527	984 291 74,973	1986 Annual Capacity	38,100	5,765	21,087	1,712
	1,035 279 78,171	1,065 279 78,317	1987* Annual Capacity	39,134	5,792	21,953	1,713
YEAR END CAPACITY 1983-1987	74,913	72,009	1983 Year End Capacity	36,413	5,963	19,216	1,653
Year End Capacity is calculated by multiplying Daily Rate by number of Available Days	501 873 76,346	559 927 73,494	1984 Year End Capacity	37,295	5,844	20,142	1,710
	396 385 77,119	388 384 74,236	1985 Year End Capacity	37,580	5,750	20,773	1,710
	1,276 88 78,483	1,273 87 75,629	1986 Year End Capacity	38,540	5,771	21,392	1,713
	762 266 78,519	762 268 75,658	1987* Year End Capacity	39,441	5,796	22,248	1,713
DAILY RATE 1983-1987	351 213.44	352 204.52	1983 Available Days Daily Rate	353 103.11	357 16.72	353 54.38	357 4.63
	351 217.29	352 208.63	1984 Available Days Daily Rate	354 105.48	357 16.38	354 56.84	358 4.78
	351 218.49	352 210.83	1985 Available Days Daily Rate	354 106.26	357 16.10	354 58.63	358 4.78
	351 223.34	352 214.69	1986 Available Days Daily Rate	354 108.99	357 16.16	354 60.39	358 4.79
	351 228.38	352 217.67	1987* Available Days Daily Rate	354 111.53	357 16.24	354 62.80	358 4.79

*Capacity additions presented here for 1987 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

PRINTING, WRITING & RELATED						PACKAGING & INDUSTRIAL CONVERTING					TISSUE
Coated Ground-wood	Coated Free Sheet	Uncoated Free Sheet	Cotton Fiber	Thin Papers	Solid Bleached Bristols	Total	Un-bleached Kraft	Bleached Packaging & Industrial Converting	Specialty Packaging	Special Industrial	Total
3,522	2,473	9,354	162	347	1,065	6,078	4,065	569	550	894	5,190
35	88	191	—	—	—	—	—	—	—	—	35
144	143	537	14	(8)	10	(87)	(111)	(3)	1	25	18
3,701	2,704	10,083	176	338	1,075	5,991	3,954	566	551	919	5,243
9	20	235	—	—	—	—	—	—	—	—	79
34	125	242	4	—	7	(236)	(251)	5	3	7	—
3,744	2,849	10,559	180	338	1,082	5,755	3,704	571	554	926	5,322
75	82	119	—	—	22	—	—	—	—	—	131
45	29	237	—	—	15	(1)	(3)	(15)	9	8	41
3,853	2,959	10,915	180	338	1,119	5,754	3,700	556	563	934	5,494
351	93	298	—	—	8	—	—	—	—	—	87
48	16	53	1	—	(2)	15	5	—	3	8	39
4,262	3,069	11,266	181	338	1,126	5,769	3,705	556	565	942	5,620
3,582	2,605	9,792	170	341	1,073	6,011	3,990	580	548	913	5,223
34	75	250	—	—	—	—	—	—	—	—	107
107	133	260	9	(3)	3	(3)	(42)	26	4	8	(28)
3,723	2,813	10,302	180	338	1,076	6,009	3,949	586	553	921	5,301
—	—	199	—	—	—	—	—	—	—	—	14
32	51	327	—	—	20	(287)	(267)	(30)	3	7	20
3,755	2,865	10,828	180	338	1,087	5,722	3,882	556	555	929	5,335
160	175	78	—	—	30	—	—	—	—	—	211
57	25	90	—	—	1	42	23	—	9	10	67
3,972	3,065	10,996	180	338	1,127	5,764	3,706	556	565	938	5,613
290	—	462	—	—	—	—	—	—	—	—	—
37	8	50	1	—	(2)	12	3	—	2	7	8
4,309	3,073	11,508	181	338	1,125	5,775	3,708	556	566	945	5,621
355	355	353	314	339	356	349	354	351	350	326	353
10.08	7.34	27.77	.54	1.01	3.01	17.23	11.26	1.60	1.56	2.80	14.78
358	356	353	316	339	356	349	354	350	351	327	353
10.41	7.90	29.16	.57	1.00	3.02	17.24	11.17	1.68	1.57	2.82	15.02
358	356	353	316	339	356	348	354	350	351	327	353
10.50	8.05	30.66	.57	1.00	3.08	16.42	10.41	1.59	1.58	2.84	15.12
357	356	353	316	339	356	348	354	350	351	327	353
11.12	8.62	31.13	.57	1.00	3.17	16.54	10.47	1.59	1.61	2.87	15.90
357	356	353	316	339	356	348	354	350	351	327	353
12.07	8.64	32.57	.57	1.00	3.16	16.57	10.48	1.59	1.61	2.89	15.92

Totals not adjusted for rounding differences.

paperboard by grade

capacity/annual • year end • daily

construction paper & board by grade

capacity/annual year end • daily

		Practical Maximum Basis Thousands short tons	PAPER BOARD Total	UNBLEACHED KRAFT PAPERBOARD			SOLID BLEACHED PACKAGING PAPERBOARD					SEMI- CHEMICAL PAPER- BOARD Total	RECYCLED PAPERBOARD								
				Total	Liner- board	Folding	Other	Total	Liner- board	Folding	Milk Carton & Food Service		Other	Total	Liner- board	Corru- gating Medium	Container Chip & Filler Board	Folding	Set-up	Gypsum Wall Board Facing	Other
ANNUAL CAPACITY 1983-1987 Annual Capacity includes changes in capacity only for the portion of the year in which they are actually effective	1983	Annual Capacity	35,451	17,511	16,217	800	493	4,129	111	1,992	1,812	215	5,119	8,692	395	1,427	247	2,671	324	1,217	2,412
		New Machines	78	14	14	—	—	—	—	—	—	—	64	—	—	—	—	—	—	—	—
		Net Improvements	369	265	257	7	2	58	(7)	30	42	(8)	36	9	—	55	5	(42)	(6)	15	(17)
	1984	Annual Capacity	35,898	17,790	16,488	807	495	4,187	104	2,022	1,854	207	5,219	8,702	394	1,482	252	2,629	318	1,232	2,394
		New Machines	30	21	21	—	—	—	—	—	—	—	4	12	12	—	—	—	—	—	—
		Net Improvements	468	216	214	—	2	134	—	25	110	—	75	42	17	10	—	3	—	16	(5)
	1985	Annual Capacity	36,403	18,027	16,723	807	497	4,321	104	2,047	1,964	207	5,299	8,756	424	1,493	252	2,632	318	1,248	2,389
		New Machines	556	207	170	—	37	186	—	136	50	—	—	162	162	—	—	—	—	—	—
		Net Improvements	(88)	(20)	21	—	(41)	(154)	—	(102)	(53)	1	51	38	—	12	—	17	—	1	7
	1986	Annual Capacity	36,874	18,214	16,914	807	493	4,354	104	2,081	1,961	208	5,350	8,956	587	1,504	252	2,650	318	1,249	2,396
	New Machines	228	75	62	—	14	152	—	119	33	—	—	—	—	—	—	—	—	—	—	
	Net Improvements	82	72	76	—	(4)	(67)	—	(47)	(21)	—	44	33	—	9	—	12	1	5	7	
1987*	Annual Capacity	37,183	18,362	17,052	807	503	4,439	104	2,153	1,974	208	5,393	8,989	587	1,513	252	2,661	319	1,255	2,403	

YEAR END CAPACITY 1983-1987 Year End Capacity is calculated by multiplying Daily Rate by number of Available Days	1983	Year End Capacity	35,596	17,594	16,293	807	493	4,097	104	1,988	1,788	207	5,112	8,783	382	1,478	281	2,681	319	1,218	2,455
		New Machines	51	34	34	—	—	—	—	—	—	—	17	—	—	—	—	—	—	—	—
		Net Improvements	552	322	318	—	4	149	—	33	116	—	158	(77)	19	13	1	(61)	(1)	27	(76)
	1984	Year End Capacity	36,199	17,960	16,645	807	497	4,247	104	2,032	1,904	207	5,287	8,715	412	1,489	282	2,619	318	1,246	2,380
		New Machines	175	—	—	—	—	—	—	—	—	—	—	175	175	—	—	—	—	—	—
		Net Improvements	312	163	163	—	—	82	—	17	66	—	21	46	—	7	—	25	—	2	12
	1985	Year End Capacity	36,886	18,112	16,808	807	497	4,328	104	2,048	1,970	207	5,307	8,837	587	1,488	282	2,644	318	1,248	2,391
		New Machines	621	283	232	—	51	339	—	255	84	—	—	—	—	—	—	—	—	—	—
		Net Improvements	(218)	(72)	(26)	—	(45)	(242)	—	(157)	(86)	1	80	36	—	12	—	9	—	6	8
	1986	Year End Capacity	37,089	18,324	17,014	807	503	4,428	104	2,147	1,967	208	5,367	8,972	587	1,508	282	2,653	318	1,255	2,400
		New Machines	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Net Improvements	128	60	60	—	—	14	—	6	8	—	31	22	—	6	—	11	1	—	5
	1987*	Year End Capacity	37,217	18,384	17,074	807	503	4,448	104	2,183	1,975	208	5,388	8,985	587	1,514	252	2,664	319	1,255	2,405

DAILY RATE 1983-1987	1983	Available Days	351	354	354	351	355	356	338	356	356	355	354	340	351	345	338	338	331	339	339
		Daily Rate	101.52	49.67	45.98	2.30	1.39	11.52	.31	5.82	5.02	.58	14.44	25.88	1.12	4.28	.74	7.92	.97	3.60	7.25
	1984	Available Days	351	354	354	351	355	356	338	356	357	356	354	340	351	345	338	338	331	339	339
		Daily Rate	103.17	50.68	46.98	2.30	1.40	11.92	.31	5.70	5.33	.58	14.92	25.64	1.17	4.32	.74	7.74	.96	3.68	7.03
	1985	Available Days	351	354	354	351	355	356	338	356	357	356	354	340	350	345	338	338	331	339	339
		Daily Rate	104.53	51.14	47.44	2.30	1.40	12.15	.31	5.75	5.51	.58	14.98	26.28	1.67	4.34	.74	7.81	.96	3.68	7.06
	1986	Available Days	351	354	354	351	355	356	338	357	357	356	354	340	350	345	338	338	331	339	339
		Daily Rate	105.68	51.73	48.02	2.30	1.42	12.42	.31	6.02	5.51	.58	15.15	26.38	1.67	4.37	.74	7.84	.96	3.70	7.08
	1987*	Available Days	351	354	354	351	355	356	338	357	357	356	354	340	350	345	338	338	330	339	339
		Daily Rate	105.95	51.90	48.19	2.30	1.42	12.46	.31	6.04	5.53	.58	15.24	26.44	1.67	4.39	.74	7.87	.97	3.70	7.10

CONSTRUCTION PAPER & BOARD & WET MACHINE BOARD			
Total	Construction Paper	Wet Machine Board	Insulating Board
2,891	1,234	173	1,484
1	—	1	—
(15)	10	4	(29)
2,877	1,244	178	1,455
2	—	2	—
(26)	(23)	—	(2)
2,853	1,221	179	1,453
—	—	—	—
1	1	—	—
2,854	1,222	179	1,453
—	—	—	—
2,854	1,222	179	1,453

2,904	1,248	177	1,478
2	—	2	—
(54)	(29)	—	(26)
2,852	1,220	179	1,453
—	—	—	—
1	1	—	—
2,853	1,221	179	1,453
—	—	—	—
1	1	—	—
2,854	1,222	179	1,453
—	—	—	—
2,854	1,222	179	1,453

329	340	314	323
8.01	3.67	.56	4.58
330	341	313	322
8.66	3.58	.57	4.50
330	341	313	322
8.66	3.58	.57	4.50
330	341	313	322
8.66	3.58	.57	4.50
330	341	313	322
8.66	3.58	.57	4.50

wood pulp by grade

capacity/annual • year end • daily
for paper & paperboard

for construction
paper & board

		Practical Maximum Basis Thousands short tons	ALL GRADES WOOD PULP	WOOD PULP (excl. pulp for Construction Paper & Board)	DISSOL- VING	CHEMICAL PAPER GRADES					AND SODA		SEMICHEMICAL			MECHANICAL				SCREEN- INGS	WOOD PULP FOR CONSTRUCTION PAPER & BOARD				
						SULFITE			SULFATE																
						Total	Bleached	Unbleached	Total	Hardwood	Softwood	Unbleached	Total	Bleached	Unbleached	Total	Stone Ground- wood	Refiner	Thermo- mechan- ical		Total	Total	Stone Ground- wood & Refiner	Defib- rated/ Exploded	
ANNUAL CAPACITY 1983-1987 Annual Capacity includes changes in capacity only for the portion of the year in which they are actually effective	1983	Annual Capacity	57,590	56,143	1,525	44,284	1,788	1,404	385	42,495	9,179	12,111	21,206	4,490	367	4,122	5,814	3,146	480	2,188	31	1,447	576	871	
		New Machines	403	403	—	148	—	—	—	148	110	39	—	47	—	47	208	—	—	208	—	—	—	—	—
		Net Improvements	468	593	(21)	548	(63)	50	(113)	611	375	279	(43)	32	6	26	32	(12)	18	27	1	(125)	(90)	(34)	
	1984	Annual Capacity	58,461	57,139	1,504	44,980	1,726	1,454	272	43,255	9,663	12,429	21,163	4,569	374	4,195	6,054	3,134	498	2,423	31	1,322	486	837	
		New Machines	356	356	—	350	—	—	—	350	172	179	—	—	—	—	6	—	—	6	—	—	—	—	—
		Net Improvements	251	304	—	319	(8)	8	(16)	327	270	346	(290)	41	—	41	(55)	(69)	9	5	—	(53)	—	(53)	
	1985	Annual Capacity	58,069	57,900	1,504	45,650	1,718	1,462	256	43,932	10,105	12,954	20,873	4,609	374	4,236	6,005	3,065	507	2,433	31	1,268	486	783	
		New Machines	329	329	—	307	—	—	—	307	247	60	—	—	—	—	21	21	—	—	—	—	—	—	—
		Net Improvements	840	840	—	764	4	4	—	760	319	324	116	15	—	15	61	(6)	2	65	—	—	—	—	—
	1986	Annual Capacity	60,237	59,988	1,504	46,721	1,722	1,466	256	44,999	10,671	13,339	20,989	4,624	374	4,251	6,088	3,080	509	2,499	31	1,289	486	783	
		New Machines	314	314	—	211	—	—	—	211	95	115	—	—	—	—	103	32	—	72	—	—	—	—	—
		Net Improvements	317	317	—	234	2	2	—	231	57	64	110	30	—	30	54	6	1	47	—	—	—	—	—
	1987*	Annual Capacity	60,988	60,599	1,504	47,165	1,724	1,468	256	45,441	10,823	13,518	21,100	4,654	374	4,280	6,245	3,118	510	2,617	31	1,290	486	783	
YEAR END CAPACITY 1983-1987 Year End Capacity is calculated by multiplying Daily Rate by number of Available Days	1983	Year End Capacity	56,161	56,796	1,504	44,722	1,757	1,416	341	42,964	9,480	12,268	21,216	4,509	374	4,136	6,030	3,134	490	2,406	31	1,365	484	881	
		New Machines	462	462	—	439	—	—	—	439	245	194	—	—	—	—	23	—	—	23	—	—	—	—	—
		Net Improvements	227	323	—	207	(40)	45	(85)	247	124	259	(136)	100	—	100	16	—	16	—	—	(96)	1	(97)	
	1984	Year End Capacity	56,849	57,580	1,504	45,367	1,717	1,461	256	43,650	9,649	12,720	21,081	4,609	374	4,236	6,068	3,134	506	2,429	31	1,298	486	783	
		New Machines	88	88	—	88	—	—	—	88	52	35	—	—	—	—	—	—	—	—	—	—	—	—	—
		Net Improvements	618	618	—	686	1	1	—	684	467	407	(189)	—	—	—	(68)	(75)	3	5	—	—	—	—	—
	1985	Year End Capacity	59,556	59,286	1,504	46,141	1,719	1,463	256	44,422	10,368	13,162	20,892	4,609	374	4,236	6,001	3,059	508	2,434	31	1,289	486	783	
		New Machines	478	478	—	425	—	—	—	425	303	122	—	—	—	—	53	53	—	—	—	—	—	—	—
		Net Improvements	578	578	—	440	6	6	—	434	117	170	148	26	—	26	111	—	1	110	—	—	—	—	—
	1986	Year End Capacity	60,810	59,341	1,504	47,006	1,725	1,469	256	45,282	10,788	13,454	21,040	4,635	374	4,261	6,165	3,112	510	2,543	31	1,289	486	783	
		New Machines	185	185	—	88	—	—	—	88	31	57	—	—	—	—	97	—	—	97	—	—	—	—	—
		Net Improvements	197	197	—	149	(1)	(1)	—	150	31	44	75	20	—	20	27	25	—	2	—	—	—	—	—
	1987*	Year End Capacity	60,992	60,723	1,504	47,244	1,724	1,468	256	45,520	10,850	13,566	21,114	4,655	374	4,282	6,288	3,137	510	2,642	31	1,289	486	783	
DAILY RATE 1983-1987	1983	Available Days	355	355	349	355	353	352	359	355	355	354	356	354	356	354	358	356	360	359	361	330	345	331	
		Daily Rate	163.98	158.91	4.31	125.93	4.98	4.03	.95	120.95	26.69	34.65	59.61	12.73	1.05	11.68	16.86	8.79	1.36	6.71	.09	4.97	1.40	2.66	
	1984	Available Days	355	356	349	355	353	352	358	355	354	354	356	354	356	354	358	356	360	359	361	330	345	330	
		Daily Rate	165.97	162.19	4.31	127.81	4.87	4.15	.72	122.94	27.78	35.92	59.24	13.02	1.05	11.97	16.97	8.79	1.40	6.77	.09	3.78	1.41	2.37	
	1985	Available Days	355	355	349	355	353	352	358	355	354	354	356	354	356	354	358	357	360	359	361	330	345	330	
		Daily Rate	167.96	164.18	4.31	129.99	4.87	4.16	.72	125.12	29.26	37.17	58.70	13.02	1.05	11.97	16.78	8.58	1.41	6.79	.09	3.78	1.41	2.37	
	1986	Available Days	355	355	349	355	353	352	358	355	354	354	356	354	356	354	358	356	360	358	361	330	345	330	
		Daily Rate	170.98	167.18	4.31	132.45	4.89	4.17	.72	127.56	30.45	38.00	59.11	13.09	1.05	12.04	17.24	8.73	1.42	7.10	.09	3.78	1.41	2.37	
	1987*	Available Days	355	355	349	355	353	352	358	355	354	354	356	354	356	354	358	356	360	358	361	330	345	330	
		Daily Rate	172.97	168.28	4.31	133.12	4.89	4.17	.72	128.23	30.63	38.29	59.32	13.15	1.05	12.10	17.62	8.80	1.42	7.41	.09	3.79	1.41	2.37	

*Capacity additions presented here for 1987 include only presently known commitments and do not necessarily represent final expansion plans of the industry for that year.

†Excludes the defibrated/exploded pulp capacity of mills that produce hard pressed board. Totals not adjusted for rounding differences.

annual capacity/regional distribution

paper & paperboard

 TOTAL U.S. CAPACITY		GRADES	 NEW ENGLAND		 MID-ATLANTIC	
1983	1987		1983	1987	1983	1987
		Practical Maximum Basis/Thousands short tons				
74,017	76,171	TOTAL ALL GRADES PAPER & PAPERBOARD	5,891	6,259	5,929	6,099
71,123	76,317	TOTAL PAPER & PAPERBOARD	5,815	6,194	5,372	5,514
35,675	39,134	TOTAL PAPER	4,997	5,365	3,842	4,063
5,774	5,792	NEWSPRINT	N.A.	N.A.	N.A.	N.A.
18,633	21,953	PRINTING, WRITING & RELATED	3,736	4,041	2,351	2,451
1,710	1,713	Uncoated Groundwood	733	786	235	164
3,522	4,262	Coated Groundwood	1,280	1,324	264	264
2,473	3,069	Coated Free Sheet	295	404	137	185
9,863	11,785	Uncoated Free Sheet ¹	1,406	1,520	1,699	1,819
1,065	1,126	Solid Bleached Bristols	23	8	16	18
6,078	5,769	PACKAGING & INDUSTRIAL CONVERTING	436	462	236	245
5,190	5,620	TISSUE	533	544	1,048	1,160
35,451	37,183	TOTAL PAPERBOARD	818	830	1,531	1,451
17,511	18,362	UNBLEACHED KRAFT	—	—	—	—
16,217	17,052	of which Kraft Linerboard	—	—	—	—
4,129	4,439	SOLID BLEACHED	N.A.	N.A.	—	—
5,119	5,393	SEMICHEMICAL	N.A.	N.A.	—	—
8,692	8,989	RECYCLED	688	699	1,531	1,451
2,891	2,854	TOTAL CONSTRUCTION PAPER & BOARD	66	65	557	585

wood pulp

1983	1987	TOTAL ALL GRADES WOOD PULP	1983	1987	1983	1987
57,850	60,868	TOTAL WOOD PULP (exc. pulp for Construction Paper & Board)	3,294	3,336	1,473	1,472
56,143	59,599	DISSOLVING	—	—	—	—
1,525	1,504	SULFITE PAPER GRADES	N.A.	N.A.	N.A.	N.A.
1,788	1,724	SULFATE & SODA PAPER GRADES	1,921	1,953	490	494
42,526	45,472	Bleached & Semibleached Softwood	737	720	159	159
12,111	13,518	Bleached & Semibleached Hardwood	1,153	1,204	331	336
9,179	10,823	Unbleached ²	N.A.	N.A.	—	—
21,237	21,131	SEMICHEMICAL	N.A.	N.A.	418	426
4,490	4,654	MECHANICAL	971	981	189	189
5,814	6,245					
1,447	1,289	WOOD PULP FOR CONSTRUCTION PAPER & BOARD³	80	82	120	102

(1) Includes cotton fiber and thin papers.

(2) Includes screenings.

(3) Excludes defibrated/exploded pulp capacity of mills that produce hard pressed board.

 E. NO. CENTRAL		 W. NO. CENTRAL		 SO. ATLANTIC		 E. SO. CENTRAL		 W. SO. CENTRAL		 MOUNTAIN & PACIFIC*	
1983	1987	1983	1987	1983	1987	1983	1987	1983	1987	1983	1987
11,664	12,476	1,835	1,952	17,717	18,929	9,635	10,371	10,719	11,782	10,637	11,302
11,355	12,167	1,422	1,550	17,116	18,408	9,264	9,969	10,338	11,405	10,445	11,111
6,902	7,601	954	1,054	5,441	6,276	3,938	4,329	4,549	5,092	5,053	5,354
N.A.	N.A.	—	—	818	1,017	1,130	1,071	1,335	1,158	1,853	1,881
4,622	5,217	940	1,038	2,199	2,791	1,764	2,363	1,540	2,276	1,480	1,776
265	285	N.A.	N.A.	N.A.	N.A.	152	148	N.A.	N.A.	156	167
1,045	1,308	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	90	91
864	1,012	N.A.	N.A.	N.A.	N.A.	348	336	N.A.	N.A.	115	121
2,337	2,495	249	257	1,271	1,602	1,058	1,626	789	1,138	1,053	1,327
112	117	—	—	367	415	N.A.	N.A.	401	421	66	70
801	841	N.A.	N.A.	2,019	1,994	486	251	1,231	1,125	855	835
1,339	1,403	—	—	406	473	558	645	442	533	865	861
4,453	4,566	467	496	11,674	12,131	5,326	5,640	5,789	6,313	5,391	5,757
—	—	—	—	7,713	8,042	3,371	3,566	3,568	3,799	2,859	2,955
—	—	—	—	7,281	7,603	2,968	3,154	3,154	3,387	2,814	2,907
N.A.	N.A.	—	—	1,696	1,804	729	755	1,239	1,413	434	437
1,607	1,684	N.A.	N.A.	1,130	1,085	854	942	615	732	748	786
2,844	2,880	403	433	1,136	1,201	372	377	367	370	1,352	1,578
309	309	413	403	601	521	371	402	381	377	192	191

3,465	3,956	850	893	18,164	19,129	10,212	11,271	10,359	10,817	9,768	9,995
3,343	3,830	582	620	17,732	18,873	10,001	11,039	10,229	10,704	9,685	9,909
—	—	—	—	620	598	N.A.	N.A.	—	—	649	646
485	476	—	—	N.A.	N.A.	—	—	—	—	793	734
1,121	1,518	293	305	15,640	16,600	8,114	9,065	8,601	8,932	6,346	6,605
323	370	N.A.	N.A.	3,695	4,345	2,038	2,436	2,389	2,557	2,685	2,847
570	920	N.A.	N.A.	2,737	3,034	2,401	3,061	1,659	1,932	131	128
N.A.	N.A.	N.A.	N.A.	9,208	9,221	3,674	3,568	4,553	4,444	3,531	3,631
1,338	1,372	N.A.	N.A.	847	839	722	774	458	544	590	588
398	465	245	271	625	834	911	941	1,169	1,228	1,307	1,336
122	126	268	273	432	256	211	232	130	113	83	86

N.A. — Not available.

Totals not adjusted for rounding differences.

*Includes Alaska

world capacity

wood pulp (Except Defibrated/Exploded & Screenings)

Thousands of METRIC tons

	TOTALS		Percent Increase	MECHANICAL		SEMICHEMICAL		CHEMICAL PAPER GRADES		
	1983	1987		1983	1987	1983	1987	1983	1987	of which 1983
WORLD TOTAL	149,513	160,433	7.3	35,066	38,154	9,561	10,069	98,857	105,956	31,480
DEVELOPED MARKET ECONOMIES	121,489	128,748	6.8	29,889	32,405	7,761	7,914	80,253	85,769	25,965
NORTH AMERICA	73,808	77,948	5.6	14,793	15,839	4,535	4,696	52,898	55,769	14,710
of which: U.S.	50,932	54,068	6.2	5,274	5,665	4,073	4,222	40,203	42,816	7,270
Canada	22,877	23,878	4.4	9,519	10,174	462	474	12,695	12,953	7,440
JAPAN	12,459	12,907	1.2	2,546	2,546	1,478	1,336	7,982	8,276	1,058
WESTERN EUROPE	21,638	24,535	9.2	11,168	12,567	1,182	1,307	18,168	19,614	9,476
of which: E.E.C.	8,038	8,759	11.9	2,992	3,423	389	439	2,405	2,636	1,150
Nordic countries	10,462	12,175	8.4	7,162	8,040	675	750	12,035	12,865	6,410
Rest of Western Europe	5,149	5,521	9.2	1,014	1,104	118	118	3,728	4,113	1,916
OCEANIA	2,303	2,885	8.6	1,028	1,078	401	410	897	1,037	681
OTHERS	1,287	2,113	66.8	354	375	165	165	308	1,073	40
DEVELOPING MARKET ECONOMIES	8,867	10,660	23.0	1,422	1,865	584	830	6,409	7,618	2,858
AFRICA	724	815	12.6	78	48	26	41	620	726	497
LATIN AMERICA	5,857	7,053	20.4	705	1,006	389	455	4,706	5,515	2,190
of which: Brazil	3,983	4,202	5.5	332	509	150	150	3,009	3,481	1,548
Mexico	520	761	22.7	79	199	—	—	541	562	—
ASIA	2,086	2,792	33.8	639	811	169	334	1,083	1,377	171
CENTRALLY PLANNED ECONOMIES	19,353	20,027	3.5	3,755	3,884	1,216	1,325	12,195	12,569	2,657
of which: USSR	13,278	13,162	3.6	2,445	2,500	800	850	8,400	8,700	2,000

Totals not adjusted for rounding differences.

*No data available for 1987.

industry structure

integration to wood pulp in U.S. paper & paperboard mills

DEGREE OF INTEGRATION TO WOOD PULP	NEW ENGLAND		MID-ATLANTIC		E. NO. CENTRAL		W. NO. CENTRAL	
	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY
TOTAL REGION	89	100%	106	100%	134	100%	18	100%
100% or more	7	17	2	5	1	1	2	6
80% to 95%	3	11	1	1	4	9	1	12
60% to 79%	3	17	3	4	10	14	6	27
40% to 59%	2	10	9	24	12	16	1	17
20% to 39%	1	1	2	2	5	6	1	7
0% to 19%	—	—	—	—	—	—	—	—
Not integrated	73	44	89	64	102	54	7	31

All data based on machines in place January 1983

paper & paperboard (Except Insulating & Hard Pressed Board)

Thousands of METRIC tons

market 1986*	DISSOLVING		TOTALS		Percent Increase	NEWSPRINT		PRINTING & WRITING		WRAPPING		ALL OTHERS	
	1983	1987	1983	1987		1983	1987	1983	1987	1983	1987	1983	1987
33,454	6,030	6,253	206,214	224,634	8.9	30,796	33,229	51,678	58,852	104,127	111,534	19,613	21,019
27,560	3,591	3,657	161,888	175,186	8.4	26,275	27,659	42,482	48,549	78,599	83,746	14,302	15,226
15,796	1,584	1,641	81,500	86,818	6.5	15,208	15,225	18,415	21,816	43,593	45,383	4,284	4,386
8,098	1,383	1,364	46,332	50,501	7.1	5,238	5,255	16,589	19,609	40,468	42,071	3,507	3,571
7,698	201	277	15,888	18,304	3.9	9,970	9,970	1,826	2,207	3,125	3,312	777	815
1,058	449	449	23,198	24,801	6.1	2,837	2,959	5,357	6,180	10,529	11,377	3,875	4,086
9,712	1,118	1,067	52,770	56,836	11.5	7,154	8,324	17,505	19,903	22,327	24,236	5,784	6,376
1,220	252	261	27,480	31,115	13.3	1,782	2,519	10,020	11,580	12,071	13,022	3,593	3,934
6,595	580	520	16,485	18,520	12.5	4,585	4,955	4,795	5,500	5,860	6,695	1,225	1,370
1,897	286	286	3,330	3,204	4.1	787	850	2,690	2,823	4,396	4,519	966	1,012
809	—	—	2,508	2,854	5.8	685	705	278	293	1,332	1,430	214	226
185	440	500	1,581	2,270	35.3	391	446	327	357	818	1,320	145	152
3,237	252	347	16,783	22,429	19.4	1,753	2,654	4,419	5,139	10,569	12,262	2,042	2,374
498	—	—	834	1,118	20.7	15	28	243	303	608	721	58	63
2,489	57	77	10,240	12,508	22.2	820	1,286	2,118	2,591	5,801	6,864	1,501	1,768
1,704	42	62	3,951	4,846	22.7	127	360	943	1,130	2,324	2,754	557	605
—	—	—	2,527	3,418	35.1	201	391	489	595	1,500	1,920	337	509
250	195	270	7,619	8,888	15.6	918	1,340	2,058	2,245	4,160	4,677	483	543
2,657	2,187	2,249	25,773	27,021	4.9	2,768	2,916	4,777	5,164	14,959	15,526	3,269	3,419
2,000	1,625	1,700	13,380	14,069	3.7	1,900	1,950	1,650	1,700	9,080	9,465	870	885

Source: Food and Agriculture Organization of the United Nations, U.S. capacity-American Paper Institute.

The degree of integration to wood pulp for each mill was calculated by dividing on-site wood pulp capacity by paper & paperboard capacity.

DEGREE OF INTEGRATION TO WOOD PULP	SO. ATLANTIC		E. SO. CENTRAL		W. SO. CENTRAL		MOUNTAIN & PACIFIC		DEGREE OF INTEGRATION TO WOOD PULP
	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY	NUMBER OF MILLS	SHARE OF PAPER AND PAPERBOARD CAPACITY	
TOTAL REGION	76	100%	43	100%	45	100%	70	100%	TOTAL REGION
100% or more	18	41	16	61	19	63	14	41	100% or more
80% to 99%	16	35	4	21	5	17	7	23	80% to 99%
60% to 79%	4	7	3	7	2	9	4	10	60% to 79%
40% to 59%	2	1	3	3	1	2	1	1	40% to 59%
20% to 39%	4	6	—	—	2	1	1	2	20% to 39%
01% to 19%	—	—	—	—	1	1	1	1	01% to 19%
Not integrated	32	10	17	8	15	7	42	22	Not integrated

industry structure paper & paper-board machines

year of installation or last major rebuild

distribution by region

YEAR MACHINE INSTALLED OR REBUILT	NEW ENGLAND		MID-ATLANTIC		E. NO. CENTRAL		W. NO. CENTRAL	
	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY
Total	245		231		330		38	
No Data Available	74		75		55		5	
Total Sample	171	100.0%	156	100.0%	275	100.0%	33	100.0%
1982	15	5.9	10	4.5	18	9.3	4	14.9
1981	2	3.0	5	5.2	17	7.1	1	2.6
1980	9	7.4	5	4.0	10	5.2	2	3.9
1979	4	1.8	5	3.4	7	5.1	—	—
1978	3	2.7	4	1.1	6	4.6	1	2.2
1977	9	7.9	2	0.5	9	3.5	—	—
1976	7	5.6	4	2.0	11	2.3	1	3.1
1971-1975	22	18.0	33	25.9	43	18.8	7	26.5
1966-1970	34	21.0	34	23.8	58	21.8	5	13.8
1961-1965	25	10.0	26	15.9	28	6.8	8	19.2
1956-1960	7	2.1	12	6.2	19	3.8	1	3.6
1951-1955	10	8.4	1	1.5	15	3.3	2	6.1
Prior to 1950	24	6.2	15	6.0	34	8.4	1	4.1

All data based on machines in place January 1983

distribution by product grade

paper

YEAR MACHINE INSTALLED OR REBUILT	NEWSPRINT		PRINTING & WRITING		PKG. & IND. CONVERTING		TISSUE		UNBLEACH
	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES
Total	47		437		199		226		72
No Data Available	3		93		26		63		—
Total Sample	44	100.0%	344	100.0%	173	100.0%	163	100.0%	72
1982	1	2.3	30	10.1	13	10.9	5	3.2	6
1981	4	11.7	15	6.2	7	9.9	6	4.6	6
1980	1	3.4	16	7.9	6	1.5	5	4.2	6
1979	6	17.4	11	2.8	—	—	4	4.7	3
1978	—	—	9	2.4	2	0.5	6	5.1	4
1977	—	—	16	5.2	5	5.7	5	4.1	3
1976	1	2.7	16	4.0	4	2.9	10	4.2	1
1971-1975	7	16.3	46	16.0	26	16.2	22	12.4	10
1966-1970	9	21.8	73	22.2	39	23.6	35	25.9	10
1961-1965	2	1.3	53	14.0	22	6.4	37	22.2	9
1956-1960	5	11.4	23	4.5	9	1.8	9	3.5	6
1951-1955	5	9.8	13	2.0	11	8.5	2	1.0	3
Prior to 1950	3	1.9	23	2.7	29	12.1	17	4.9	5

All data based on machines in place January 1983

In the tables below, the total capacity of machines which produce more than one grade of paper or paperboard is included under the grade representing the major portion of their production.

distribution by region

YEAR MACHINE INSTALLED OR REBUILT	SO. ATLANTIC		E. SO. CENTRAL		W. SO. CENTRAL		MOUNTAIN & PACIFIC		YEAR MACHINE INSTALLED OR REBUILT
	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	
Total	164		83		102		157		Total
No Data Available	37		14		12		24		No Data Available
Total Sample	127	100.0%	69	100.0%	90	100.0%	133	100.0%	Total Sample
1982	8	6.8	4	10.7	4	5.6	6	7.8	1982
1981	11	10.4	3	2.9	5	9.9	7	6.5	1981
1980	2	0.8	5	10.3	1	1.7	6	9.1	1980
1979	9	9.1	2	3.2	3	3.4	3	3.1	1979
1978	8	8.4	1	0.7	3	3.2	4	2.5	1978
1977	4	2.6	1	4.3	6	6.3	7	5.5	1977
1976	4	3.8	3	2.1	4	1.8	5	3.6	1976
1971-1975	24	17.0	14	18.2	16	20.5	17	17.7	1971-1975
1966-1970	20	15.0	11	24.2	21	26.9	23	16.2	1966-1970
1961-1965	12	8.0	9	8.8	11	10.5	26	15.6	1961-1965
1956-1960	10	6.7	7	8.6	6	5.3	8	4.2	1956-1960
1951-1955	8	6.1	2	2.9	4	2.3	7	4.8	1951-1955
Prior to 1950	7	5.3	7	3.1	6	2.6	14	3.4	Prior to 1950

paperboard

construction grades

ED KRAFT	SOLID BLEACHED		SEMICHEMICAL		RECYCLED		CONSTRUCTION		YEAR MACHINE INSTALLED OR REBUILT
PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	NUMBER OF MACHINES	PERCENT OF TOTAL CAPACITY	
	30		43		185		101		Total
	—		—		47		64		No Data Available
100.0%	30	100.0%	43	100.0%	148	100.0%	37	100.0%	Total Sample
8.5	3	8.1	3	6.8	7	5.2	1	6.1	1982
9.5	—	—	2	6.8	11	7.6	—	—	1981
6.7	—	—	1	1.7	5	3.5	—	—	1980
3.5	3	12.0	1	2.2	5	5.3	—	—	1979
6.9	1	3.5	5	14.5	2	0.6	1	0.3	1978
2.9	2	6.4	—	—	6	6.4	1	3.5	1977
1.5	2	6.6	—	—	2	1.5	3	3.2	1976
16.1	5	19.3	14	37.1	32	24.6	14	51.4	1971-1975
17.8	3	17.5	10	19.6	23	14.9	4	6.1	1966-1970
11.1	3	10.9	4	7.4	10	4.9	5	9.8	1961-1965
6.9	4	9.5	2	3.0	9	5.4	3	7.4	1956-1960
4.5	2	5.0	1	0.9	12	6.3	—	—	1951-1955
4.1	2	1.2	—	—	24	13.8	5	12.2	Prior to 1950

fiber sources

for paper/paperboard/wood pulp manufacture

fiber consumption in paper & paperboard manufacture

Thousands short tons

	Total U.S.	Percent of Total Fiber	New England	Mid-Atlantic	East-North Central	West-North Central	South Atlantic	East-South Central	West-South Central	Mountain & Pacific
1983										
TOTAL FIBER	68,087	100.0	5,088	5,086	10,336	1,509	16,584	9,259	10,282	9,945
TOTAL WOOD PULP	51,834	76.1	3,866	2,798	5,690	955	13,850	8,186	8,976	7,513
Manufactured on-site	43,372	63.7	2,134	1,215	2,692	676	13,368	7,855	8,746	6,686
*Purchased & transferred	8,462	12.4	1,732	1,583	2,998	279	481	331	231	828
†TOTAL RECYCLABLE PAPER	15,822	23.2	1,110	2,244	4,609	534	2,649	1,040	1,245	2,390
Mixed Papers	1,908	2.8	129	422	508	107	364	152	95	130
Newspapers	2,692	4.0	117	611	675	55	408	62	142	621
Corrugated	7,443	10.9	290	635	2,108	302	1,474	647	660	1,327
Pulp Substitutes	2,456	3.6	400	345	650	49	401	162	187	263
High Grade Deinking	1,323	1.9	175	232	667	22	2	17	160	48
OTHER FIBERS	431	0.7	111	43	37	20	86	33	61	41
1984										
TOTAL FIBER	72,358	100.0	5,517	5,175	11,080	1,584	17,832	9,880	10,670	10,620
TOTAL WOOD PULP	55,002	76.0	4,185	2,817	6,031	1,017	14,937	8,746	9,252	8,017
Manufactured on-site	45,996	63.6	2,284	1,193	2,839	731	14,408	8,369	9,058	7,115
*Purchased & transferred	9,006	12.4	1,901	1,023	3,192	286	529	378	194	902
†TOTAL RECYCLABLE PAPER	16,912	23.4	1,213	2,316	5,010	547	2,819	1,097	1,357	2,554
Mixed Papers	2,053	2.8	132	421	570	111	378	163	138	142
Newspapers	2,868	4.0	130	647	722	56	425	64	124	699
Corrugated	7,973	11.0	323	637	2,258	309	1,589	708	741	1,408
Pulp Substitutes	2,535	3.5	421	352	703	50	418	138	188	264
High Grade Deinking	1,483	2.1	207	259	756	22	9	23	166	41
OTHER FIBERS	443	0.6	118	42	40	20	76	37	61	49
1985										
TOTAL FIBER	74,062	100.0	5,701	5,313	11,383	1,636	18,162	10,094	10,866	10,907
TOTAL WOOD PULP	55,981	75.6	4,295	2,780	6,109	1,054	15,257	8,945	9,393	8,148
Manufactured on-site	46,910	63.3	2,401	1,184	2,867	763	14,724	8,559	9,161	7,251
*Purchased & transferred	9,072	12.3	1,894	1,595	3,243	291	533	386	232	897
†TOTAL RECYCLABLE PAPER	17,607	23.8	1,266	2,491	5,231	562	2,829	1,112	1,411	2,705
Mixed Papers	2,127	2.9	139	448	579	112	386	168	140	155
Newspapers	3,021	4.1	143	666	760	58	424	65	126	779
Corrugated	8,369	11.3	334	759	2,338	319	1,678	716	773	1,452
Pulp Substitutes	2,515	3.4	443	367	732	52	321	139	188	272
High Grade Deinking	1,576	2.1	208	251	821	22	19	24	184	47
OTHER FIBERS	473	0.6	139	43	43	20	76	37	61	54
1986										
TOTAL FIBER	76,102	100.0	5,875	5,513	11,818	1,657	18,550	10,308	11,382	11,220
TOTAL WOOD PULP	57,201	75.2	4,422	2,873	6,222	1,061	15,533	9,080	9,765	8,245
Manufactured on-site	47,870	62.9	2,482	1,190	2,959	767	14,936	8,684	9,533	7,319
*Purchased & transferred	9,331	12.3	1,940	1,683	3,262	294	597	396	232	926
†TOTAL RECYCLABLE PAPER	18,410	24.2	1,307	2,593	5,351	576	2,938	1,191	1,533	2,321
Mixed Papers	2,204	2.9	145	463	593	114	401	177	152	158
Newspapers	3,113	4.1	155	685	773	61	435	71	150	782
Corrugated	8,831	11.6	342	800	2,384	326	1,743	785	816	1,655
Pulp Substitutes	2,627	3.5	454	384	764	53	338	151	202	280
High Grade Deinking	1,635	2.1	211	261	836	22	19	27	214	48
OTHER FIBERS	491	0.6	146	46	44	20	79	37	64	55

*Comprises all dried, wet lap or slush pulp not produced on-site including transfers from company owned or affiliated mills.

†Includes construction grades and molded pulp products.

FIBER CONSUMPTION IN PAPER AND PAPERBOARD MANUFACTURE (Continued)

Thousands short tons

	Total U.S.	Percent of Total Fiber	New England	Mid-Atlantic	East-North Central	West-North Central	South Atlantic	East-South Central	West-South Central	Mountain & Pacific
1987										
TOTAL FIBER	77,154	100.0	5,914	5,580	11,829	1,667	18,808	10,472	11,611	11,273
TOTAL WOOD PULP	58,028	75.2	4,438	2,892	6,380	1,065	15,777	9,220	9,961	8,295
Manufactured on-site	48,549	62.9	2,491	1,191	3,050	769	15,126	8,824	9,735	7,363
*Purchased & transferred	9,479	12.3	1,947	1,701	3,330	296	651	396	226	932
†TOTAL RECYCLABLE PAPER	18,634	24.2	1,329	2,642	5,406	582	2,952	1,214	1,586	2,923
Mixed Papers	2,215	2.9	149	463	595	114	404	178	153	158
Newspapers	3,127	4.0	161	685	775	61	437	72	154	783
Corrugated	8,830	11.6	352	799	2,399	332	1,757	785	851	1,655
Pulp Substitutes	2,700	3.5	456	419	797	54	334	152	205	282
High Grade Deinking	1,662	2.2	211	277	839	22	19	27	222	44
OTHER FIBERS	493	0.6	147	46	44	20	79	37	64	55

Totals not adjusted for rounding differences.

pulpwood consumption in wood pulp manufacture

Thousands of CORDS

1983										
TOTAL PULPWOOD	81,399	100.0	4,929	2,171	4,804	1,087	25,139	14,541	14,132	14,586
Roundwood & Forest Residues	47,988	59.0	3,780	1,737	3,578	885	16,518	10,350	8,829	2,282
Manufacturing Residues	3,582	4.4	—	62	388	166	1,247	315	913	492
	29,828	36.6	1,149	322	838	36	7,375	3,876	4,390	11,843
1984										
TOTAL PULPWOOD	86,410	100.0	5,115	2,339	5,021	1,128	26,882	15,517	14,625	15,783
Roundwood & Forest Residues	51,227	59.3	3,750	1,970	3,731	920	17,763	11,157	9,245	2,690
Manufacturing Residues	3,698	4.3	—	76	413	169	1,342	331	918	451
	31,486	36.4	1,366	293	877	40	7,776	4,029	4,463	12,642
1985										
TOTAL PULPWOOD	88,583	100.0	5,185	2,330	5,094	1,168	27,730	16,445	14,689	15,854
Roundwood & Forest Residues	52,852	59.7	3,791	1,972	3,737	947	18,543	11,848	9,238	2,777
Manufacturing Residues	3,759	4.2	—	62	471	180	1,336	323	918	470
	31,982	36.1	1,394	296	886	40	7,851	4,274	4,535	12,707
1986										
TOTAL PULPWOOD	91,442	100.0	5,213	2,343	5,899	1,170	28,509	16,679	15,117	16,412
Roundwood & Forest Residues	54,971	60.1	3,880	1,977	4,459	950	19,143	12,072	9,581	2,909
Manufacturing Residues	3,803	4.2	—	67	530	180	1,309	324	918	475
	32,668	35.7	1,433	299	911	40	8,057	4,282	4,619	13,028
1987										
TOTAL PULPWOOD	91,858	100.0	5,316	2,352	5,771	1,172	28,841	16,767	15,119	16,530
Roundwood & Forest Residues	55,332	60.2	3,883	1,988	4,306	953	19,487	12,157	9,580	3,002
Manufacturing Residues	3,849	4.2	—	67	553	180	1,326	324	918	481
	32,676	35.6	1,433	299	913	40	8,048	4,288	4,621	13,037

Totals not adjusted for rounding differences.

FIBER
CONSUMPTION
DEFINITIONS

1983—Actual consumption

1984—Best estimate based on year-to-date experience

1985-87—Consumption at capacity levels of production

recyclable paper consumed in paper & paperboard manufacture

actual consumption

Thousands Short Tons

END PRODUCTS	1983					
	Total	Mixed Papers	News-papers	Corru-gated	Pulp Substi-tutes	High Grade Deinking
TOTAL ALL GRADES	25,862	1,908	2,692	7,443	2,456	1,323
TOTAL PAPER	4,247	97	1,199	250	1,521	1,180
NEWSPRINT	1,082	—	1,036	—	46	—
PRINTING, WRITING & RELATED	1,020	6	—	8	727	279
PACKAGING & IND. CONVERTING	245	14	10	74	142	5
TISSUE	1,900	77	153	168	606	896
TOTAL PAPERBOARD	10,449	1,373	1,258	6,855	835	129
KRAFT, BLEACHED & UNBLEACHED	1,321	—	—	1,234	65	23
SEMICHEMICAL	1,360	7	4	1,346	3	—
RECYCLED	7,768	1,366	1,254	4,275	767	106
CONSTRUCTION PAPER & BOARD	1,126	438	235	338	101	14

Data on recyclable paper are collected in an industry-wide survey of paper and paperboard mills under the following definitions.

1983—Actual consumption

1984—Best estimate based on year-to-date experience

1985-1987—Consumption at capacity levels of production

planned future consumption

Thousands Short Tons

END PRODUCTS	1984					
	Total	Mixed Papers	News-papers	Corru-gated	Pulp Substi-tutes	High Grade Deinking
TOTAL ALL GRADES	16,912	2,053	2,868	7,973	2,535	1,483
TOTAL PAPER	4,602	105	1,319	284	1,577	1,316
NEWSPRINT	1,194	—	1,136	—	58	—
PRINTING, WRITING & RELATED	1,107	6	—	10	739	352
PACKAGING & IND. CONVERTING	282	14	10	94	158	5
TISSUE	2,019	85	173	180	622	959
TOTAL PAPERBOARD	11,186	1,510	1,304	7,371	853	148
KRAFT, BLEACHED & UNBLEACHED	1,393	—	—	1,306	56	31
SEMICHEMICAL	1,541	7	4	1,527	3	—
RECYCLED	8,252	1,503	1,300	4,538	794	117
CONSTRUCTION PAPER & BOARD	1,124	438	246	317	105	18

END PRODUCTS	1985					
	Total	Mixed Papers	News-papers	Corru-gated	Pulp Substi-tutes	High Grade Deinking
TOTAL ALL GRADES	17,607	2,127	3,021	8,369	2,515	1,576
TOTAL PAPER	4,771	130	1,414	319	1,526	1,381
NEWSPRINT	1,273	—	1,213	—	60	—
PRINTING, WRITING & RELATED	1,051	6	—	11	650	384
PACKAGING & IND. CONVERTING	293	14	10	104	160	5
TISSUE	2,154	110	191	204	656	992
TOTAL PAPERBOARD	11,699	1,562	1,349	7,730	882	176
KRAFT, BLEACHED & UNBLEACHED	1,500	—	—	1,391	60	50
SEMICHEMICAL	1,567	7	5	1,552	3	—
RECYCLED	8,632	1,555	1,344	4,787	819	126
CONSTRUCTION PAPER & BOARD	1,135	433	258	319	106	19

END PRODUCTS	1986					
	Total	Mixed Papers	News-papers	Corru-gated	Pulp Substi-tutes	High Grade Deinking
TOTAL ALL GRADES	18,410	2,204	3,113	8,831	2,627	1,635
TOTAL PAPER	4,938	134	1,435	336	1,600	1,435
NEWSPRINT	1,287	—	1,222	—	65	—
PRINTING, WRITING & RELATED	1,055	6	—	11	654	385
PACKAGING & IND. CONVERTING	318	15	10	114	174	5
TISSUE	2,278	113	203	211	707	1,045
TOTAL PAPERBOARD	12,282	1,615	1,409	8,159	920	180
KRAFT, BLEACHED & UNBLEACHED	1,616	—	—	1,505	60	52
SEMICHEMICAL	1,596	7	5	1,581	3	—
RECYCLED	9,070	1,608	1,404	5,073	857	128
CONSTRUCTION PAPER & BOARD	1,190	455	271	336	108	21

END PRODUCTS	1987					
	Total	Mixed Papers	News-papers	Corru-gated	Pulp Substi-tutes	High Grade Deinking
TOTAL ALL GRADES	18,634	2,215	3,127	8,930	2,700	1,662
TOTAL PAPER	5,063	134	1,437	357	1,676	1,459
NEWSPRINT	1,299	—	1,222	—	77	—
PRINTING, WRITING & RELATED	1,073	6	—	11	673	383
PACKAGING & IND. CONVERTING	336	15	10	132	175	5
TISSUE	2,355	113	205	214	751	1,071
TOTAL PAPERBOARD	12,380	1,626	1,419	8,237	917	181
KRAFT, BLEACHED & UNBLEACHED	1,654	—	—	1,542	60	52
SEMICHEMICAL	1,614	7	5	1,599	3	—
RECYCLED	9,112	1,619	1,414	5,096	854	129
CONSTRUCTION PAPER & BOARD	1,190	455	271	336	108	21

Totals not adjusted for rounding differences.

Recyclable paper for molded pulp included under Construction Paper & Board as follows: 1983, 174,000 tons; 1984, 184,000 tons; 1985-87, 192,000 tons.

announced capacity expansion

NEW MILLS & MACHINES

Expansion projects include new paper, paperboard and wood pulp mills and new paper and paperboard machines in existing mills. These projects have been publicly announced by the managements of the companies concerned and are included in the capacity estimates reported in this survey. Estimates also include confirmed expansion projects that have not been publicly announced which, in keeping with the confidential nature of the survey, are not included in this listing.

PROJECTS INCLUDED IN SURVEY ESTIMATES

Thousands short tons

Grade	Annual Capacity	Proposed Start-up	Company & Location
Newsprint	225	1983	Augusta Newsprint Company Augusta, GA
Coated Groundwood	200	1987	Bowater Incorporated Catawba, SC
Coated Groundwood	180	1987	Consolidated Papers Incorporated Wisconsin Rapids, WI
Coated Free Sheet	200	1982-1983	Scott Paper Company Skowhegan, ME
Uncoated Free Sheet	150	1983	Champion International Corporation Courtland, AL
Uncoated Free Sheet	200	1987	Champion International Corporation Quinnesec, MI
Uncoated Free Sheet	160	1984	Crown Zellerbach Corporation Camas, WA
Uncoated Free Sheet	100	1985	Georgia Pacific Corporation Crossett, AR
Uncoated Free Sheet	230	1986	Georgia Pacific Corporation Port Hudson, LA
Uncoated Free Sheet	185	1987	Hammermill Paper Company Selma, AL
Uncoated Free Sheet	300-350	1985	International Paper Company Mobile, AL
Uncoated Free Sheet	215	1984	Union Camp Corporation Eastover, SC
Tissue	16	1984	Cascade Paper Incorporated Rockingham, NC
Tissue	56	1986	Crown Zellerbach Corporation S. Glens Falls, NY
Tissue	N.A.*	1984	Fort Howard Paper Company Green Bay, WI
Tissue	N.A.	1986	Fort Howard Paper Company Muskogee, OK
Tissue	70	1986	James River Corporation Naheola, AL
Tissue	14	1985	Tagsons Papers Incorporated Mechanicville, NY
Tissue	65	1982-1983	Wisconsin Tissue Mills Incorporated Menasha, WI
Unbleached Kraft Linerboard	315*	1985-86	Chesapeake Corporation West Point, VA
Solid Bleached Paperboard	250*	1986	Westvaco Corporation Covington, VA
Semichemical Paperboard	210	1982-1983	Macmillan Bloedel Incorporated Pine Hill, AL
Recycled Paperboard	175	1985	Temple-Inland Incorporated Ontario, CA
Wet Machine Board	3	1984	Lydall Incorporated Hoosick Falls, NY
Bleached Sulfate Pulp	265	1986	Champion International Corporation Quinnesec, MI
Bleached Sulfate Pulp	365	1984	Leaf River Forest Products Incorporated New Augusta, MS

N.A.—Not available. * Will replace existing capacity.

definitions and grade descriptions

Practical Maximum Capacity: Practical Maximum Capacity, as defined in this survey, is the tonnage of paper, paperboard or pulp of normal commercial quality that could be produced with full use of equipment and adequate supplies of raw materials and labor, and assuming full demand. No allowance is made for losses due to unscheduled shutdowns, strikes, temporary lack of power, etc., which cause decreases in actual production, but not in productive capacity. Capacity of paper machines which produce more than one grade is apportioned in accordance with actual production patterns or plans for future operation.

Capacity is reported in short tons of net finished paper and paperboard and air-dry (10% moisture content) pulp. Shrinkage of bleached or semi-bleached pulp is taken into account.

Annual practical maximum capacity—includes changes in capacity only for the portion of the year in which they are actually effective.

Year-end practical maximum capacity—assumes that all changes in capacity are in effect from the first day of the year in which they occur.

New Machines and Net Improvements: Capacity increases or decreases are shown in two main groups: New Machines and Net Improvements.

New Machines—are defined as machines purchased or to be purchased from equipment manufacturers. Consequently, capacity changes resulting from transfers of paper machines from one mill to another are shown under Net Improvements.

Net Improvements—are defined as net changes resulting from modernization of machines, dismantling old machines, shifts in grades, etc.

Capacity increases from new machines are shown under New Machines for the first two years of operation (including the year of installation). Any additional capacity realized in a third or subsequent year is shown under Net Improvements.

Market Pulp Capacity: Market pulp in this survey is defined as wood pulp produced in the U.S. for sale to pulp consumers. It excludes pulp for use or consumption by a producing mill or for shipment by a producing mill to other mills within its supply region which it owns, controls or in which it is affiliated. Shipments to owned mills outside the U.S. are defined as market pulp.

PAPER GRADES

Newsprint: Paper used chiefly in the printing of newspapers, made largely from mechanical pulp and weighing not less than 28½ pounds nor more than 35 pounds (24 × 36 – 500).

Uncoated Groundwood: Uncoated papers containing more than 10% groundwood or other mechanical pulps in their furnish, excluding newsprint.

Machine and Off Machine Coated: Bleached papers with a coating weight of at least 2½ pounds (25 × 38 – 500) on either side and at least 50% of the coating consisting of clay (Kaolin).

Coated Groundwood: Coated papers containing more than 10% mechanical pulp (mostly stone groundwood and/or refiner) in their furnish.

Coated Free Sheet: Coated papers containing 10% or less mechanical pulp (mostly stone groundwood and/or refiner) in their furnish.

Uncoated Free Sheet: Bleached uncoated printing and writing papers containing not more than 10% groundwood or other mechanical pulps in their furnish; i.e., offset, tablet, envelope, business papers (bond, ledger, mimeo, duplicator) form bond, cover and text and related papers.

Bleached Bristols: Includes tabulating index, tag and file folder, coated cover bristols, and uncoated bristols (index, printing, and postcard).

Cotton Fiber: Papers containing 25% or more in their furnish of cotton, cotton rags, cotton waste, linters, linter pulp, flax, or similar fibers.

Thin Papers: Includes carbonizing, condenser, cigarette, bible, and similar papers.

Packaging and Industrial Converting: Wrapping paper, shipping sack, bag and sack other than shipping sack, and other converting papers—18 pounds and over.

Unbleached Kraft: Paper containing more than 80% unbleached sulfate wood pulp. Wrapping paper, shipping sack, grocers sack and other bag, and other converting papers—18 lbs. and over (24 × 36 – 500).

Bleached Packaging and Industrial Converting: Paper made for similar end uses as unbleached kraft, but made from bleached, and semibleached sulfate and unbleached sulfite pulps. Wrapping paper, shipping sack, grocers and other bag and sack, and other converting papers—18 lbs. and over (24 × 36 – 500).

Specialty Packaging: Paper and board of all weights and furnishes, usually used as protective packaging for food and other consumer products, such as bakery bags, fast food and frozen food wraps. Also includes glassine, greaseproof and vegetable parchment paper.

Special Industrial: Paper and board, of all weights, calipers and furnishes, designed for specialized end uses and manufactured to exact customer specifications; includes abrasive paper, electrical insulation, filter paper and similar grades. Does not include wet machine board.

Tissue: Includes sanitary grades: i.e., toilet, facial, napkin, toweling, sanitary napkin, wiper and special sanitary papers, and waxing, wrapping, wadding and miscellaneous grades.

PAPERBOARD GRADES

Unbleached Kraft Paperboard: Paperboard made from a furnish containing not less than 80% wood pulp produced by the kraft sulfate process.

Linerboard: Unbleached kraft paperboard manufactured for use as facing material when combining paperboard for conversion into corrugated or solid fiber boxes. Includes solid unbleached kraft linerboard, both Fourdrinier and Cylinder, mottled white linerboard and clay coated unbleached kraft linerboard.

Folding: Paperboard manufactured, such as clay coated unbleached kraft and bleached lined unbleached kraft backed, for conversion into folding cartons and beverage carriers.

Other: All unbleached kraft paperboard whose end use is not otherwise classified, such as board for a filler for solid fiber board to be fabricated into a shipping container, tube, can, drum, file folder, tag, automotive panel, etc.

Solid Bleached Packaging Paperboard: Paperboard made for use in packaging from a furnish containing not less than 80% virgin bleached wood pulp. Bleached bristols not manufactured for packaging are included in the proper bleached bristol classification under papers.

Linerboard: Solid bleached paperboard, either Fourdrinier or Cylinder, manufactured for use as facing material when combining paperboard for conversion into corrugated or solid fiber boxes.

Folding: Solid bleached paperboard for conversion into folding cartons, such as folding cartons for ice cream, butter, oleomargarine, frozen foods, bakery products, cosmetics, drugs, etc.

Milk Carton and Food Service: Solid bleached paperboard for conversion into milk carton, heavyweight cup, and round nested food container, plate, dish and tray, and for packaging for moist liquid and oily foods.

Other: Solid bleached paperboard for conversion into packaging of blister pack, tubes and other products not classified above and for industrial products not classified under bleached bristols.

Semichemical Paperboard: Paperboard made from a furnish containing not less than 75% virgin wood pulp, the predominant portion of which is produced by a semichemical process.

Recycled Paperboard: Paperboard manufactured from a combination of recycled fibers from various grades of paper stock with the predominant portion of its furnish being recycled fibers: sometimes including a very minor portion of virgin fibers.

Linerboard: Recycled paperboard produced from a furnish containing less than 80% virgin kraft wood pulp and used as facing material when combining paperboard for conversion into corrugated or solid fiber boxes.

Corrugating Medium: Recycled paperboard produced from a furnish containing less than 75% virgin wood pulp and used as the fluting material when combining paperboard for conversion into corrugated boxes.

Container Chip and Filler Board: Recycled paperboard manufactured as a filler for solid fiber board for conversion into solid fiber boxes and other container chipboard (all chipboard under 26 pounds per 1000 sq. ft. manufactured for use as facing corrugated, solid fiber and single faced products which are used for interior packing, e.g., pads, partitions, dividers, layers and cushioning).

Folding: Recycled paperboard manufactured with bending quality for conversion into folding cartons (including unlined chipboard, kraft lined, white lined and clay coated).

Set-up: Recycled paperboard manufactured with non-bending specifications for conversion into rigid or set-up boxes (including plain chipboard, newslined, white vat lined).

Gypsum Wallboard Facing: Recycled paperboard manufactured for use as liner or facing on gypsum board, plasterboard (includes white, cream, gray, blue and all colors).

Other: Recycled paperboard with the same characteristics as paperboard for bending packaging or non-bending packaging but for non-packaging uses; plus recycled paperboard for end uses not otherwise classified, such as tag, file folder, tube, can, drum, match stem, tablet backs, toys, etc.

CONSTRUCTION PAPER & BOARD & OTHER

Construction Paper: Sheathing paper, felts (roofing felts, floor covering, automotive felts, deadening, industrial, pipe covering, refrigerator), asbestos paper and asbestos filled paper, flexible wood fiber insulation.

Wet Machine Board: Binders board, shoe board (e.g., counter board, heel board, innersole, etc.) automotive board, chair seat backing, coaster board, luggage, mill board, panel board, table top board, etc.

Insulating Board: A fibrous-felted homogenous panel made by interfelting of the fibers (e.g., interior building board, wallboard, sound deadening board, acoustical tile, exterior sheathing board, roof insulation board, trailer board, etc.).

WOOD PULP

Dissolving & Special Alpha: Highly refined bleached white sulfite or sulfate pulp with a high content of alpha (pure cellulose) fiber.

Sulfite Paper Grades: Paper grade pulps produced by the sulfite process. Bleached pulp must achieve a G.E. Brightness of more than 75.

Sulfate & Soda Paper Grades: Paper grade pulps produced by the sulfate or soda process. Bleached pulp must achieve a G.E. Brightness of more than 75. Semibleached pulp must achieve a G.E. Brightness of not less than 45 or more than 75.

Semichemical: High yield pulps produced with the use of some chemical agent such as neutral sulfite (N.S.S.C.); alkaline cook; chemipulp (defibrated pulp put through reaction chambers); chemi-mechanical pulp with a yield usually above 60%.

Mechanical: Fine textured, usually bright pulps, used in paper and paperboard manufacture and produced by mechanical rather than chemical processes.

Stone Groundwood: Pulp produced by grinding wood logs or bolts (usually 4 ft. in length) into relatively short fibers.

Refiner: Pulp produced by subjecting wood chips and/or residues to atmospheric or open discharge refining.

Thermomechanical: A high-yield pulp produced by a thermomechanical process in which wood particles are softened by pre-heating under pressure prior to a pressurized primary refining stage. Usually replaces or reduces the chemical pulp component in newsprint or groundwood papers.

WOOD PULP FOR CONSTRUCTION PAPER & PAPERBOARD

Coarse, often brown, pulps used in the manufacture of insulating board and construction paper. Also includes similar pulps if used in the manufacture of wet machine board. Excludes pulp for hard pressed board.

Stone Groundwood and Refiner: Pulps produced by the stone groundwood or refiner processes but used in the manufacture of construction paper and board.

Defibrated/Exploded: Pulps produced by subjecting wood chips to preheating and pressurized refining. Similar to the thermomechanical process except that operating variables produce an economical, coarse brown pulp suitable only for construction paper and board.

Screenings: Rejects and off-quality screenings from all grades of wood pulp except dissolving.

FIBERS

Roundwood: Comprises roundwood bolts and logs (4 feet or longer, including tree lengths) brought to the pulpmill for chipping, or chips made from primary roundwood bolts and logs at a chipmill, remote from the pulpmill.

Forest Residues: All logging residues such as portions of bolts or logs less than the minimum diameter specified by the consuming mill and poles, saplings, slash, limbs, twigs, or portions of bolts or logs not regarded as merchantable in normal pulpwood or sawlog operations. May also include merchantable portions of trees that will not be used for higher value products. Chips made from forest residues.

Manufacturing Residues: All mill residues such as slabs, edgings, trimmings, cores, planer shavings, sawdust or other wood residues of a wood manufacturing process and chips made from these residues.

Other Fibers: Cotton linters, cotton linter pulp, textile mill waste and cuttings, rags, waste rope and cordage, bagasse, flax, straw, jute, esparto, kenaf and all other vegetable fibers used in paper and paperboard manufacture.

RECYCLABLE PAPER

Mixed Papers: Number 1 and 2 mixed papers, super mixed papers, boxboard cuttings, mill wrappers.

Newspapers: Number 1 news, overissue news, super news. Any grade to be used as a news substitute.

Corrugated: Old containers both corrugated and solid fiber, container plant cuttings.

Pulp Substitutes & High Grade Deinking: Includes ledger, tabulating cards, bleached sulfate shavings (unless used as a news substitute), Envelope and bleached sulfite and sulfate cuttings, coated book stock, news and publication blanks, kraft paper and bags and all other grades not classified above.

Print free grades are reported as *Pulp Substitutes* and printed grades, if deinked, are reported as *High Grade Deinking*.



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CORRIGENDUM

	CHEMICAL PAPER GRADES of which: market	
	<u>1983</u>	<u>1986*</u>
WORLD TOTAL	27,547	29,012
DEVELOPED MARKET ECONOMIES	22,188	23,289
NORTH AMERICA	12,358	13,208
U.S.	5,336	6,037
CANADA	7,022	7,171
JAPAN	983	983
WESTERN EUROPE	8,511	8,568
E.E.C.	1,061	1,126
NORDIC COUNTRIES	5,645	5,660
REST OF WESTERN EUROPE	1,805	1,782
OCEANIA	296	345
OTHERS	40	185
DEVELOPING MARKET ECONOMIES	2,761	3,125
AFRICA	496	497
LATIN AMERICA	2,094	2,378
of which: BRAZIL	1,467	1,608
MEXICO	--	--
ASIA	171	250
CENTRALLY PLANNED ECONOMIES	2,598	2,598
of which: U.S.S.R.	2,000	2,000

*No data available for 1987.